

**REMARKS**

The Examiner has rejected claims 13 and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Shirouzu, and further in view of Tachibana. Applicant traverses these rejections because the cited references fail to disclose or suggest all of the claim limitations. Specifically, the references fail to disclose at least the following limitations:

**Claim 13:**

a second element which separates a color brightness data, *expressed in a brightness-separable YUV color space where color can be expressed by being separated into brightness and chromaticity*, of said background and each of said partial straight lines; and

a third element which produces a shading range having a starting point and a ending point, wherein said shading range is adjacent to one of said partial straight lines, and makes the brightness of said shading range change smoothly *in said brightness-separable color space*, from said starting point to said ending point by placing the brightness data of said background at said starting point and the brightness data of said straight line at said ending point.

**Claim 19:**

a second element which separates a color brightness data, *expressed in a brightness-separable YUV color space where color can be expressed by being separated into brightness and chromaticity*, of said background and each of said partial straight lines; and

a third element which produces shading ranges having a starting point and a ending point, wherein said shading ranges are adjacent to said partial straight lines, respectively, and make the brightness of each of said shading ranges change smoothly *in said brightness-separable color space*, from said starting point to said ending point by placing the brightness data of said background at said starting point and the brightness data of said straight line at said ending point.

In the present claimed invention, before performing linear interpolation of color data for each pixel, the color data expressed in the RGB color space, is converted into color data expressed in the YUV color space, and after that, color data for each pixel between the starting point and ending point is computed.

One feature of the present claimed invention, when color data for each pixel between the starting point and ending point of the partial line is computed by performing linear interpolation, is that it is possible to output high quality interpolated color data in which brightness of the partial line from the starting point to the ending point continuously changes. It is possible to perform high quality anti-alias processing appropriately for human visual characteristics sensitive to a change of brightness rather than a change of chromaticity.

On the other hand, Shirouzu is related to an anti-alias line generating method and anti-alias line generator for smoothly drawing an oblique line for an image display apparatus having high precision utilized in the field of computer graphics, for example, a CRT. In a CRT, color data for each pixel is expressed in the RGB color space. However, Shirouzu is silent about converting the color space for each pixel before performing linear interpolation of color data for each pixel in anti-alias processing. In Shirouzu, color data for each pixel between the starting point and ending point is computed without converting into color data expressed in the YUV color space in anti-alias processing.

The Examiner states that Shirouzu teaches providing both intensity data and X, Y data, where the X, Y data is representative of color data. Applicant respectfully disagrees that the X, Y data in Shirouzu represents color/chromaticity data. The X and Y axis drawing data in Shirouzu reference (col. 2, lines 26-34), namely, (x3)229 and (y3)231, are x-coordinate and y-coordinate (the position in two-dimension). They are not color/chromaticity data. The X and Y axis drawing data in Shirouzu reference (col. 2, lines 26-34) correspond to the (x,y) of 5 elements (x,y,R,G,B). They are not (R,G,B). The present invention expresses the color as (x,y,Y,U,V). Shirouzu at col. 2, lines 26-34 discloses outputting intensity data 228 of RGB

which is calculated at the interpolation calculation, to display coordinate (x3,y3). Shirouzu expresses the color at the position (x,y) as 255 gradation sequence (R,G,B) as 8bit. However, the claimed invention expresses the color at the position (x,y) as (Y,U,V), where Y is luminance and U, V are chromaticity.

Unlike Shirouzu, in the present claimed invention, it is possible to perform high quality anti-alias processing appropriately for human visual characteristics sensitive to a change of brightness rather than a change of chromaticity.

In Tachibana, the DDA 2 generates the intensity value of each of pixels that are plotted to form the line between start and end points in the bitmap in the frame buffer 3 according to anti-aliasing conditions. The CRT controller 4 controls a serial port of the frame buffer 3 and displays the line stored in the bitmap of the frame buffer 3 on the CRT 5. However, as stated above, in a CRT, color data for each pixel is expressed in the RGB color space. Tachibana is also silent about converting the color space for each pixel before performing linear interpolation of color data for each pixel in anti-alias processing. In Tachibana, color data for each pixel between the starting point and ending point is also computed without converting into color data expressed in the YUV color space in anti-alias processing.

In addition, since neither of the cited references discloses or suggests the YUV color space, there is no suggestion or motivation for one of skill in the art at the time of the invention to modify the Shirouzu reference to use an YUV color space.

Regarding claims 18 and 20, they should be allowable at least based on their dependence from claims 13 and 19 for at least the same reasons describe above.

AMENDMENT UNDER 37 C.F.R. § 1.111  
USSN: 09/887,168

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In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Carl J. Pellegrini  
Registration No. 40,766

SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

WASHINGTON OFFICE  
23373  
CUSTOMER NUMBER

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